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## 6.9 THE PENN STATE DOPPLER NETWORK PROGRESS REPORT

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At the Second Workshop on Technical Aspects of MST Radar, the software and hardware implementation for the PSU network was discussed (THOMSON, 1984). Delayed delivery of RF equipment and signal processing components resulted in modification of our original timetable. It was determined that the best approach for implementing the second VHF radar would be when the first VHF radar was in reliable and unattended operation. In Table 1, a short summary of the specifications for the three radars is shown. Experiences, plans and improvements for the PSU network are summarized below.

## A. VHF1 50-MHz 2/3 beam radar located 15 km south of State College, PA

- 1) This system became fully operational June 27, 1985. The sole reason for system failures since the onset has been ac outages which are prevalent in this area. Battery back-up and computer-controlled auto-restart of the transmitters (microprocessor controlled) has circumvented this problem.
- 2) Initial performance statistics done by FRISCH et al., WPL on August 1985 data, indicate very good performance by VHF1. On Beam #1, the next to last range gate (16.8 km MSL) was able to make a wind measurement 99% of the time, while Beam #2 was able to measure the wind at this height 85% of the time. The difference between these two beams is either a bad element or a loss in relay switches in Beam #2 or a noise source in one of the sidelobes. Samples of radar data from VHF1 are shown in Figures 1 and 2.
- 3) Future changes on VHF1 will be the implementation of a vertical beam. One of the antennas will be phased switched in order to orient the beam to vertical. Software and hardware are in hand, but will not be utilized until our 2nd unit VHF2 is operational.

## B. VHF2 50-MHz 2/3 beam radar to be located in NW Pennsylvania near Clarion, PA

- 1) The process of site location and acquisition is underway for an identical 50-MHz system. This site will be the 2nd point on an equilateral triangle positioned over west central Pennsylvania.
- 2) All hardware and software components have been delivered. Expected initial turn-on of VHF2 is early 1986.

## C. UHF1 portable 440-MHz 2/3 beam radar to be initially located in SW Pennsylvania near Somerset, PA

- 1) This system is ready for installation pending the delivery of the RF components purchased from Tycho Technology, Inc.
- 2) Site selection for UHF1 will commence as soon as VHF2 is operational.

Table 1 Specifications for Penn State ST radars

| Item                          | VHF1 and VHF2                            | UHF1                      |
|-------------------------------|--|---------------------------|
| Type                          | Pulsed Doppler                           | Pulsed Doppler            |
| Location                      | 1: S of State College<br>2: NW of Dubois | SW of Johnstown           |
| Frequency                     | 1: 49.80 MHz<br>2: 49.92 MHz             | 405 MHz                   |
| Bandwidth                     | 300, 100 KHz                             | 1 MHz, 300 kHz,<br>70 kHz |
| Peak Power                    | 30 kW                                    | 30 kW                     |
| Pulsewidth                    | 3.67, 9.67 $\mu$ sec                     | 1, 4, 16 $\mu$ sec        |
| Antenna:                      |  |                           |
| Type                          | Phased Array CoCo                        | 64 7-element Yagis        |
| Dimensions                    | 50 m x 50 m                              | 8 m x 8 m                 |
| Angle(s)                      | 75° and 90°                              | 75°                       |
| On Site Computer              | Data General Eclipse                     | Date General Eclipse      |
| On Site Processing at<br>PW = | 3.67 $\mu$ s or 9.67 $\mu$ s             | 1, 4, 16 $\mu$ s          |
| Time Domain Aver.             | $\approx$ 400 or $\approx$ 125           | 112, 70, 35               |
| Spectral Aver.                | 8 or 16                                  | 16, 32, 64                |
| Max. Radial Vel.              | + 15.7 m/s or + 19.6 m/s                 | 18.25 m/s                 |
| Spectral Vel. Resol.          | 0.49 m/s or 0.31 m/s                     | 0.29 m/s                  |
| Height Spacing                | 290 m or 870 m                           | 100, 300, 800 m           |

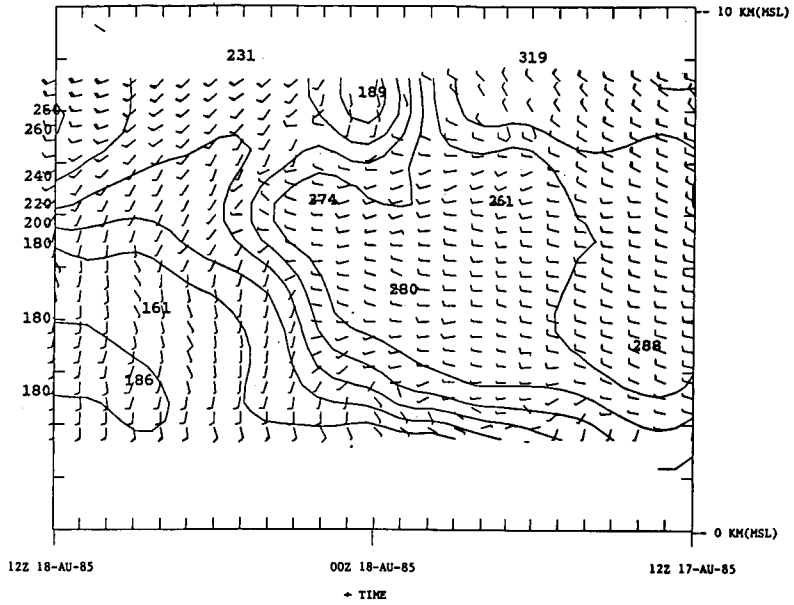


Figure 1.

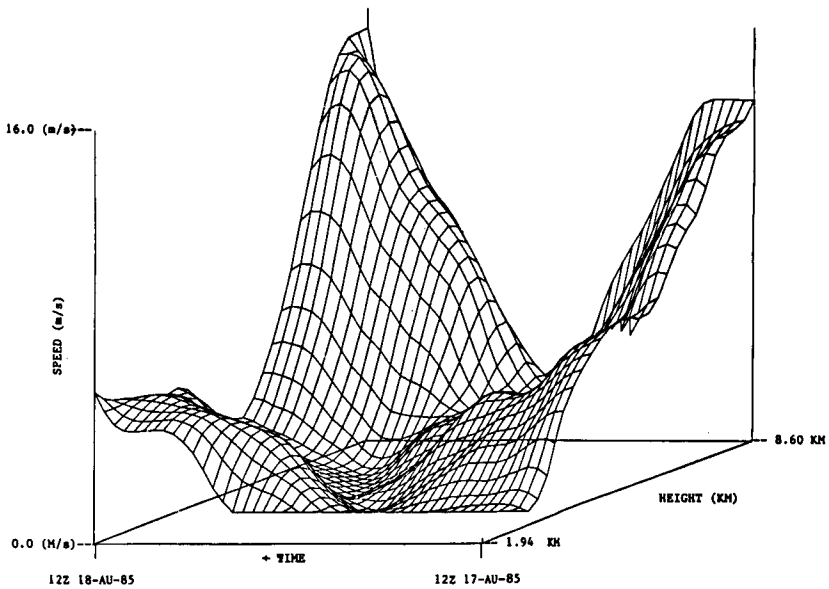


Figure 2.